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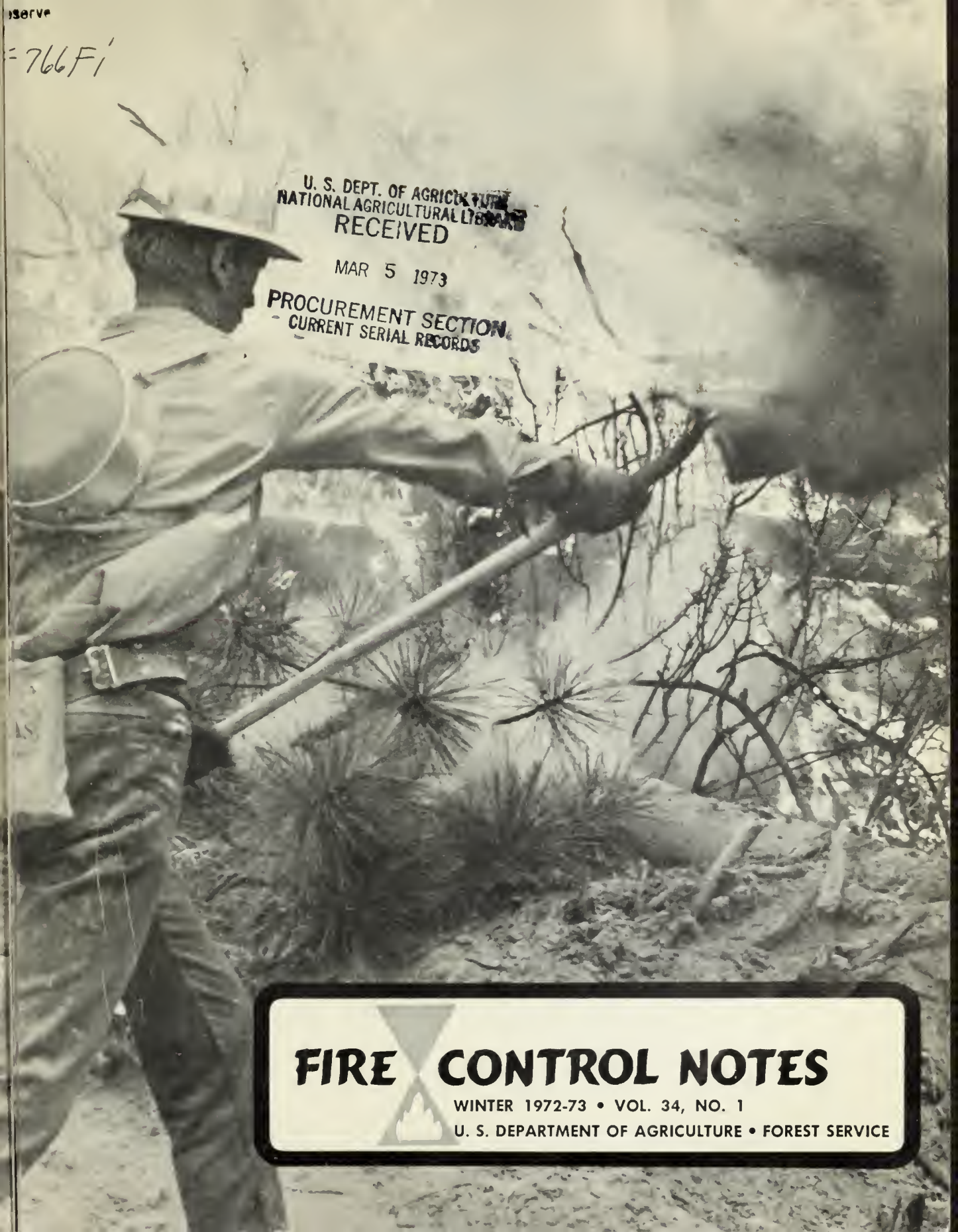
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FIRE CONTROL NOTES

WINTER 1972-73 • VOL. 34, NO. 1

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FIRE CONTROL NOTES

An international quarterly periodical devoted to forest fire management

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COVER:

The firefighter's skill, perseverance, and dirty, tough job is the backbone of the fire organization. See article this issue, "Mopup is a Firefighter's Fundamental," p. 3, and summer issue, "Hand Labor is the Key to Fire Fighting," p. 9.

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Earl L. Butz, *Secretary of Agriculture*

John R. McGuire, *Chief, Forest Service*

Henry W. DeBruin, *Director, Division of Fire Management*

Edwin J. Young, *Technical Coordinator*

Sigrid Benson, *Managing Editor*

Mopup is a Firefighting Fundamental

To put a fire out, we must fight it aggressively but safely, with prompt, thorough mopup. This is a fundamental of firefighting.

But are there lapses in your organization where people wait for the fire to burn itself out; where unburned material remains inside lines and burned material outside lines; where charred and burning logs and chunks are left along the line with no effort made to chip off the burned material; when limbing up along and inside the line is not done?

Workers respond willingly when deficiencies are pointed

Excerpted from a Region 6, Division of Fire Control communication.

out, but how often will someone think to ask: "How do you want us to mopup?" Not often. And how often will someone take the time to make clear how he wants the crew to mopup?

Too often with modern conveniences and technology we lapse and ignore fundamentals like mopup. And too often we find out the hard way that fundamentals matter.

So take the time to do mopup well or to make clear how you want it done. Paying attention to this fundamental will help put a fire out, *dead* out. ▲

Mopping up with water, Pulaski's, and shovels, this hotshot crew on the Picnic Creek fire (1967) is being very thorough.





Prescribed Burning in South Surveyed, Analyzed

Walter A. Hough

Surveys made in the 13 Southern States indicate that over 2-million acres were prescribed burned annually during the past 8 years. A slight decline was experienced in 1971, following the peak year of 1970. Over two-thirds of the total acreage burned by prescription in 1971 was in four states—Georgia, South Carolina, Alabama, and Louisiana.

Costs have increased slightly since the '60s but the reasons for burning remain the same.

Surveys of the total acreage prescribed burned on State, pri-

Walter A. Hough is research forester, Southeast Forest Exp. Stn., Southern Forest Fire Lab. Macon, Ga.

vate, and Federal lands in the 13 Southern States were made in 1963, 1964, 1970, and 1971. Southeastern Area State and Private Forestry, Atlanta, Ga., assisted the Southern Forest Fire Lab. in collecting this information.

An upward trend in acreage burned had been shown by the first three surveys (1.98 million in 1963, 2.22 million in 1964,¹ and 2.53 million in 1970¹), but acreage for 1971 (2.25 million) shows a slight decline.

Is Decline Real?

There are several possible explanations for this decrease in acreage burned. The most obvi-

ous would be that weather conditions were unfavorable for burning in 1971. However, this does not appear to be the case since annual summaries indicate the weather for prescribed burning was as good in 1971 as in 1970.

Survey procedures were different for '70 and '71 and may be the reason for less reported prescribed fire acreage. Also, an awareness of the public's reaction to smoke and its possible effects on air quality may have contributed to the slight decrease in prescribed burning.

Whatever the reason, it is apparent that prescribed burning continues to be a widely used resource management tool of the southern forester. (more \)

¹ John H. Dieterich. Air-quality aspects of prescribed burning. In: Prescr. Burning Symp. Proc., Apr. 14-16, 1971, Charleston, S.C., p. 139-151.

Latest Survey Analyzed

Results of the 1971 survey show that Georgia leads all Southern States in use of prescribed fire as it has in past surveys and that two-thirds of the total acreage burned in the South is accounted for by only 4 of the 13 states. Based on the amount of acreage burned, the Southern States rank as follows:

200,000 acres or more—

Ga., S.C., La., & Ala.
(68% of acreage).

75,000 to 200,000 acres—

Fla., Miss., N.C., Ark, & Texas.

(29% of acreage).

Up to 75,000 acres—

Va., Tenn., Okla., & Ky.
(3% of acreage).

Summer Burning Not Widely Used

Only a small amount of the prescribed burning in 1971 was done between June and September (12%). Most was burned between December and March (75%). The survey also showed that only a small percent of the total acreage burned was on NF lands (9%).

Average cost of burning was found to be slightly less than \$1 per acre in the '71 survey. In the '60s, the average cost was about 50¢ per acre. This cost increase is a result of increased labor and machinery costs.

Most Burning for Hazard Reduction

The most common reasons given for using prescribed fire in 1971, in order of importance, are:

- (1) Hazard reduction (40% of acreage)
- (2) Site preparation (24% of acreage)
- (3) Undesirable species control (14% of acreage)
- (4) Wildlife habitat improvement (13% of acreage)

These continue to be the main reasons for prescribed burning in the South, as they were in the '60s. △

Small Radio System Simplifies Service Communication

Harold D. Mead

The Boise National Forest has assembled a service-net radio system that is small and efficient. It does not interfere with other fire communication networks because of its special frequency.

The equipment consists of a battery repeater, six Repco personal portables, and six older style Motorola Packsets (25 lbs. ea.).

Channels Under 168.00 Used

The Packsets are placed at base camps, heliports, and spike camps. The personal portables are used by service vehicle crews (tractor service trucks, fuel trucks, etc.) or key personnel in base camp.

Channels 164.6 and 165.4125 are used, and since most fire line communication channels are 168.00 and higher, the service net operates with minimal interference to fire line radios.

The Boise and Payette National Forests use a mountain-top base station on the service net frequencies linked to the dis-

patchers' offices. In setting up a service net for a project fire, a site that covers the entire service area of the fire is picked for the battery repeater.

Ideally, signals reach a mountain-top base station, establishing direct communication between the service net portable radios and the Forest Dispatcher.

Dual Role Possible

By increasing the number of personal portables to 18, the net will fill a dual role:

1. The system will be used for fires that create an overload on existing Forest net communications but are not large enough to justify requesting the National Fire Radio Cache.
2. The system can be split to serve two separate fires. (In southwest Idaho, there are many locations where mountain-top links can transmit communication into base camp areas without need of a repeater.)

With this radio net system the service organization can carry out efficient logistic support during fire suppression. △

Harold D. Mead is electronic technician, Boise National Forest, Idaho.

... the various agencies worked cooperatively.

Train for Cooperation

John D. Steffens

Through a training program, Forest Service and Utah State, county, and municipal firefighters gained the common understanding necessary for cooperative fire control. In 1972, burned acreage was kept down, and legal actions were more effective.

Lands along the Wasatch Front in Utah County, Utah, are owned and administered by many different agencies. All levels of Government are represented—Federal, State, county, and municipal. Because these lands are highly valuable as watersheds for such cities as Orem, Provo, and Springville, wildfires must be extinguished promptly and completely.

In the past, jurisdictional boundaries confused firefighting because they had to be determined before suppression on wildfires could be initiated. Larger acreages burned, and suppression cost rose.

Cooperation Is a Key

The problem of jurisdictional boundary disputes was solved when the State of Utah, the Bureau of Land Management, and the Forest Service entered

into a cooperative agreement which spelled out reimbursement procedures and jurisdictional controls to be followed on all boundary fires. The agreement provides for prompt initial attack on any wildfire along the Wasatch Front in Utah County.

Suppression costs are prorated according to jurisdictional responsibilities *after* the fires are out.

But Techniques and Terms Differ

Even though the procedures were set up for prompt initial attack, problems of firefighting techniques still plagued fire control agencies. Federal agencies, used to fighting wildland fires, were using techniques and terms unfamiliar to both municipal fire departments and firefighting agents for the State and county. Municipal fire departments, used to fighting structural fires, were unfamiliar with the language of Federal agencies and used techniques that were inefficient in wildland firefighting.

Personnel of the Spanish Fork Ranger District, Uinta NF, were familiar with these problems and studied the situation. As a result of their conclusions, the Forest

Service personnel met with the Utah County Fire Warden to discuss their findings.

The County Warden is a key man because municipal fire departments, agents of both Utah County and the State of Utah, are under his direction.

Education the Answer

As a result of the meeting, personnel of the Spanish Fork District volunteered to set up, organize, and present to the municipal fire departments a training course in basic wildland firefighting.

The Utah County Fire Warden acted as coordinator, contacting all municipal fire departments in Utah County. He arranged for them to schedule the wildland firefighting training. Seven departments responded affirmatively; three others promised to schedule time in the winter of 1972-1973.

Only two of the seven fire departments were fulltime (personnel on duty 24 hours a day). The remaining were all volunteer organizations and had training sessions only once a week, in the evening. For these five volunteer fire departments Spanish

John D. Steffens, forester,
Spanish Fork Ranger District,
Uinta National Forest, Utah.

Fork Ranger District personnel and the Utah County Fire Warden contributed their evenings to training.

Spanish Fork Ranger District personnel put together a training program consisting of 3 hours of programed teaching, two 3-hour sessions of live teaching, 2 hours of slide-tape teaching, and 3 hours of fire simulator experience.

To get the training rolling, they utilized the Forest Service programed text "Introduction to the Fundamental of Fire Behavior." Initial supplies of this text were borrowed from the Boise Interagency Fire Center answer sheets were supplied by the Ranger District. Each fire department was given from two to four copies of the text and a small supply of answer separates to use in train-new personnel.

After the programed text was completed, two separate "live" sessions of 3 hours each were given to each department. The first session was based on the material taught in the programed text. Students first dealt with basic tools and equipment—how to use them, why they work, and safety precautions to follow going to and working on the fire line. The second session described basic fire weather, initial attack considerations, and coordination with other agencies. Again, the programed text was used as a reference.

Liveliest Sessions Best

The two "live" training sessions were extremely valuable because it was at this time that people on the Ranger District established rapport with the local departments and freely discussed mutual problems of terminology and standard operating procedures.

Following the "live" training sessions, the slide-tape program

"Fire Investigation" was presented and discussed. This not only gave a fundamental knowledge of fire investigation but also provided an incentive to municipal departments to determine wildland fire causes.

The final training session was fire simulation. Two exercises were presented with the objective of setting priorities in initial attack. This session was highly successful and was a good ending for the training.

Effort Pays Off

The 1972 fire season was the worst in the history of Utah County. The old Buildup Index system of fire danger rating went off the chart. Lightning activity was the most frequent in many years. Man-caused fires came along regularly. However, city fire departments, the Utah County Fire Warden, and Span-

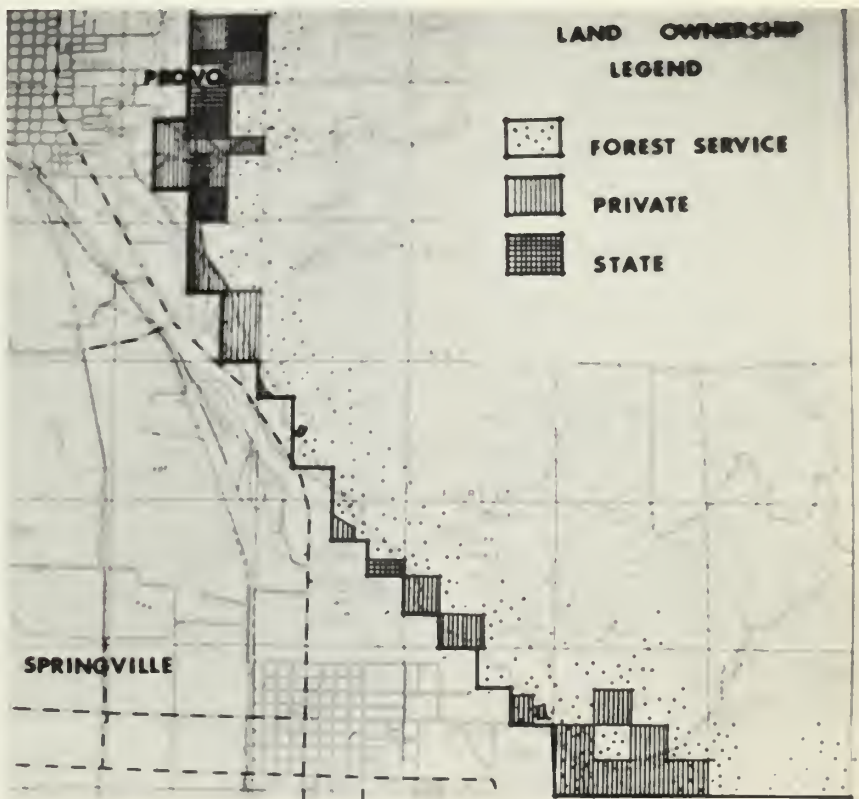
ish Fork District personnel all responded to the alarm for both boundary fires and those obviously on National Forest land but near the boundary.

Burned acreage was held to small amounts, and law enforcement actions were completed with better cases. But, most important, the various agencies worked cooperatively. Forest Service men gave on-the-ground training to municipalities. All fire control agencies began talking the same language, and municipalities learned about the scarcity of water for suppression. Hand tools were used more effectively¹ and re-calls by municipalities were reduced to zero.

Close cooperation, the goal, was achieved. △

¹ See "Hand Labor Is the Key to Firefighting," *Fire Control Notes* 33:3.

Where the valley meets the mountains, there is the zone of cooperation.



Light Helicopters Tote Initial Attack Bags

Walter C. Pettis



Does it seem to you that helicopter cargo baskets are time consuming and hazardous to load, fly, and unload? Consider then an initial attack bag slung under the 'copter. It saves time, can be dropped close to the fire, and can be jettisoned in an emergency.

Bags Cut Time, Add Safety

Initial attack bags increase safety in loading and transit. They are hooked onto the cargo hook under the helicopter when the 'copter is at rest and are dropped at their destination. This means there is less danger of men working under the ro-

tating blades while loading or unloading. Using bags also eliminates the possibility of gear or bungees coming loose and tangling in the tail rotor.

Initial attack bags can be hooked quickly, permitting the helitack personnel to save time and be in the 'copter when it is completely ready for safe take-off.

Bags cut time spent on extra trips for chain saws, gasoline, etc. Practically anything needed is included in the first trip. More time is saved because there are no baskets to unpack.

The important safety factor of these slung bags is that they can be jettisoned. Increasing both safety and time, the tools

can be placed closer to the fire than personnel can, which means the men can pick up their gear close to the fire—not lug it there.

Two Sizes of Bags Ready at Heliport

Two sizes of initial attack bags are ready at all times at the Inyo NF Base Heliport.

Small Bag for Daylight Operations

The small bag is set up for a daylight operation. Consisting of the basic set of three hand tools (Pulaski, shovel, and McLeod), six boxes of rations, two canteens, and a first aid kit, this bag weighs 55 pounds (these items are also included in the larger initial attack bag). Usually, depending on safe density

Walter C. Pettis is helicopter foreman, Mt. Whitney District, Inyo National Forest, Calif.

Symposium Gathers Current Fire Managers And Trends

altitude allowances, two men can be transported in addition to this bag.

Large Bag for Anything

The large bag, packed, with sling rope and swivel attached, weighs 155 pounds. In addition to the basic set, it contains a chain saw, chain saw pack (tools, chaps, extra gas and oil, etc.), and two lighting packs (headlamps, first aid kit, sleep-

ing bags, etc.). When packed, the bag is stored on a dolly at the helitack base. One man rolls it to the helicopter and hooks the swivel onto the cargo hook. It's ready to go.

Give It a Whirl

If you do go 'bags,' your contents list might vary, since your helitack organization may need different tools and equipment for initial attack. 

This initial attack bag is hooked up and ready to go.



The Planning for Fire Management Symposium was held Dec. 9 thru 11, 1971, in Phoenix, Ariz., sponsored by Southwestern Interagency Fire Council. The proceedings of this symposium have just become available.

These proceedings give an excellent insight into the current thinking of many leading fire managers about fire planning and fuels management. Some subjects covered were:

Fire Planning

- Fire Planning—The FOCUS Way
- The Fire Management Planning Process in Oregon
- Wildland Fire Planning for Urban Areas
- U.S. Forest Service Fire Planning Procedures

Fire Planning and Fuels Management Section

- Planning and Analyzing Large Scale Fuel Modification Programs
- The Consideration of Forest Fuels in Fire Planning
- Planning Use of Fire in Land Management
- Fire Prescriptions for Fuels and Smoke Management
- Prescribed Burning on the Apache National Forest

You Can Get a Copy

A copy of the proceedings may be purchased for \$2.50 per copy from: Dr. Malcolm J. Zwolinski, Treas. Southwestern Interagency Fire Council Dept. of Watershed Management, The University of Arizona, Tucson, Ariz. 85721 



BIFC Really Works

Ron Kalesco
Chief Dispatcher, BLM
Ed Heikkenen
Forest Service Coordinator

Susan Kizziar (BLM): "FS Coordinator on duty is Heikkenen, may I tell him who's calling, please . . . One moment, please . . ."



"Ed Heikkenen here . . . Ready for your Fire Order . . . 10-4, I am sure we can fill, will be back direct on tentative ETA and firm up . . ."

Ron, got an order here to move two FS crews from Cedar City to Boise; how're chances of using the Convair for a 1700 pickup . . ."



Ron Kalesco:
"Looks good, Ed, shoot the order to Rol, and we'll set up . . ."

So starts one of almost 2,000 fire orders handled by the Boise Interagency Fire Center (BIFC) Support Dispatch operations in 1972. In close coordination and cooperation, movement of large prime responsibility of the operation continues to be the aircraft continues to be the era. Several flights were combined to save as much as \$5,000 per flight, and it was not uncommon to save \$1,000 to \$1,200 by coordinating flights, combining resource orders in a single flight, and using the closest and best type of aircraft to do a specific job. Some 1,100 flights for 1,800 flight hours were coordinated at BIFC in support of FS and BLM, along with Bureau of Indian Affairs and National Park Service fires.

8,000 Men Moved

At BIFC, 8,000 men (including crews, smokejumpers, and overhead) were moved during 1972. From the Fire Cache at Boise, 716,000 pounds of equip-

ment and supplies were shipped, of which 412,500 pounds went by aircraft.

Prescribed Burning A Project

In June the BLM trained their specialists in a slash burning operation on the Bridger National Forest near Pinedale, Wyo. Fire weather set the stage when the forecasters predicted the needed burning weather and dispatched a mobile unit to the project.

Some 84 men were airlifted to Jackson, Wyo., and transported to the burning scene where camp was set up and burning of 400 acres handled like a project fire situation.

BIFC Supports Training

BIFC provided support to the Vale, Ore., BLM District in the training of 1,000 agricultural workers who make up the Snake River Valley Organized Crews (SRVs). These men received 2 days of practical exercise pre-



"This is Rol Parkhurst (BLM). Got a Fire Order here from the FS to use the Convair for a pickup at Cedar City at 1700 MDT and deliver 40 pax passengers to Boise. . ."



The goal of BIFC, "... more effective control of forest and range wildfire.", was reached.

ceded by demonstrations and discussions.

The 1972 fire season saw the use of the new modular system FS National Fire-Radio Cache on 31 fires in Regions 2, 3, 4, 5, 6, and 8.

Infrared imagery, mapped from the BIFC FS Beechcraft Queen Air, was flown on 27 fires. Eighty-two mapping missions were flown.

Taxpayers Benefit

In 1972, tangible results were provided by the physical joining of dispatch-coordination forces at BIFC. These results payed off in cost savings to the taxpayers and closer communications and understanding in mutual areas of concern.

The goal of BIFC: "... more effective control of forest and range wildfire," was reached. **Δ**



Air cargo loading from BIFC cache.



Mobile weather unit on Pinedale Burn

The Pinedale Prescribed Burn



Safe, Fast, Cheap . . .

Plastic-Bag Bomb Ignites Wet Fuel

Gerald R. Rustad

Plastic bags filled with sawdust and a diesel gas mixture not only ignite slash well but are cheap and easy to make.

Burning piled logging slash made up of large fuels covered with 6 inches to a foot of snow is a difficult task. But this task was simpler last fall because of the use of a sawdust and diesel-gasoline mixture in plastic garbage bags.

In the past, blivots and paint guns, with a diesel-gas mixture were used. They worked well when there were plenty of fine fuels, but conditions were not always so favorable. Besides, under good or bad conditions, too much time was spent at each pile.

In the fall of 1971, the North Park RD began experimenting with the use of plastic garbage bags. At first, the burning crews used them on difficult-to-ignite piles. Soon members of the crew found they were spending less time on these than they were using paint guns on the easy-to-ignite piles. Quart paint cans

Gerald R. Rustad is forester, North Park Ranger District, Routt National Forest, Colo.

and Nel-Spot paint guns were used with a 75-25 diesel-gas mixture. The fuel was sprayed on the pile, ignited, and continually sprayed until the pile started to burn.

Making Bags Is Simple

Making garbage bag ignitors is simple. North Park used the 3-4 gallon capacity plastic garbage bags, a 2-pound coffee can to scoop the sawdust into the bags, and approximately 1 quart of a 50-50 gas-diesel mixture poured in over the coarse sawdust. The amount of these ingredients can be varied depending on the ignition conditions. For some really difficult situations, the crew doubles the ingredients or uses two or more bags.

These bags can be used in two ways; one is to set and ignite the bag on top of the pile. As the sawdust burns, the bag melts and the burning sawdust falls down through the pile, making a bottom-to-top column of hot flame. Burning time of bag and sawdust is 15 to 25 minutes. The second way, which usually ignites piles more easily, is to throw the bag against the pile so it breaks open and the sawdust-fuel mixture is spread out, igniting it. Burning time of sawdust with this method is 5 to 10 minutes.

Making Bags Is Cheap

Even considering the time involved to put the ingredients together, the cost of one bag is only a fraction of any commer-

cial ignitor or grenades. With the use of these bags, burning cost can be cut from \$4.84 to \$1.47 per acre.

The main advantages of these bags are: (1) the materials are readily available (North Park gets free sawdust from the local mills); (2) the bags are safe to use; (3) unit for unit they are much cheaper; (4) they give more successful ignition; (5) less time is spent at each pile. (Just place the bag, ignite, and walk away.)

There are two disadvantages: One is the shelf life. The maximum storage time for filled bags is about 2 weeks. Apparently, the gas-diesel mixture deteriorates the strength of the plastic bags. The crew usually spends one day filling bags and the next day burning.

The second disadvantage is the bulkiness of the bags—if they have to be carried for any distance.

The first successful experience with these bags was on a pile of 5- to 8-inch diameter logs and larger dead material with not a single twig of fine fuels. It had been snowing for 2 days and the pile had about a foot of snow on it. Snow was still falling when the crew placed and ignited two bags on top of the pile. The crew watched the fire while they ate lunch. Much to their surprise the whole pile had burned down to smoldering pieces in the half hour it took them to eat. For the rest of the season the bags were used exclusively. 

Cooperative Initial Attack Stressed, \$1,452,000 Saved by Analysis In Salmon-Snake River Area

Howard R. Koskella

In 1969, the Salmon-Snake River Fire Management Complex was created to make a study of cooperative initial attack on fires in this problem area. The study emphasized the Management Complex's resources, which include the Nezperce, Payette, and Wallowa-Whitman National Forests as well as Department of Interior and State lands protected under mutual assistance compacts. The recommendations of this study have resulted in a large dollar savings in addition to a savings of resources and men.

One of the most costly fire problem areas within the National Forest System, the Salmon-Snake River Area, lies where the boundaries of Regions 1, 4, and 6 meet. The area covers approximately 1.8 million acres of the Nezperce and Payette Forests in Idaho and the Wallowa-Whitman Forest in Oregon.

During 1960-69 there were 1,003 fire starts during the fire season (July 15 thru Sept. 15). Forty-two of these fires were 500 acres or larger; they burned 78,631 acres. Nine hundred and twenty acres were lightning-caused, and 83 were man-caused. Combinations of severe fire weather, extremely rough topography, flash fuels and heavy timber stands, and inaccessibility

Howard R. Koskella is forester, Division of Fire Control, W.O.

created a very difficult fire control problem.

Boundaries Are Barriers

Historically, Regional and Forests boundaries have been an invisible barrier to efficient coordinated initial attack. Although inter-regional cooperation between Forests in the Salmon-Snake River Area was good, basic planning of initial attack forces had always been independently designed for each Region.

In May 1969, the Director of the W. O. Division of Fire Control recommended that the respective Regional Fire Chiefs assign a task force to the problem. Fire Staff Officers Don Williams, Nezperce NF; Howard Koskella, Payette NF; and Stewart Hanna, Wallowa-Whitman NF, were assigned to the task force to analyze and study the problem and to present solutions and recommendations.

Goals Stress Cooperation

The goals of the task force were:

1. Determine the most effective combination of initial attack resources and facilities, irrespective of management boundaries, to reduce the number of project fires within the study area to acceptable numbers.
2. Evaluate and recommend the disposition and coordination of these resources and facilities among the three Regions.



Salmon-Snake River Fire Management Complex—where Regions 1, 4, and 6 meet.

3. Develop a realistic, operational plan of integrated air and ground attack to meet management objectives within the present budget, with alternatives for further development as the budget increases.

Current Objectives Made More Realistic

The first step to achieve the goals was to review existing fire control burned-area objectives, for any one year which were:

Forest	Ideal Annual Average Burned Acres	
Nezperce	900	
Payette	1,836	
Wallowa-Whitman	1,030	
TOTAL	3,766	

Forest	Actual Annual Average	
	Burned Acres	Class D & Larger Fires ¹
Nezperce	4,768	2.9
Payette	3,140	2.4
Wallowa-Whitman	7,143	4.3
TOTAL	15,051	9.6

Forest	Actual Study Area Annual Average	
	Burned Acres	Class D & Larger Fires ¹
Nezperce	2,891	1.7
Payette	2,477	1.0
Wallowa- Whitman	2,712	1.9
TOTAL	8,080	4.6

¹ 100 acres and over.

In the task force's opinion, existing fire control objectives appeared to be valid but were misleading since resource values within the study area tended to be low.

Large Fire Occurrence To Be Reduced

Since the study area included 25 percent of the total Forests' protection area, 48 percent of class D and larger fires, and 54 percent of the burned area, the first step was to reduce large fire occurrence, since prevention and detection standards were met. This approach reemphasized the need to coordinate initial attack to reduce suppression costs.

Large-fire occurrence objective, based on complete analysis of available data, is two fires or fewer a year for the complex.

Initial Attack Revised.

The next step was a complete review of available fire occurrence statistics and all phases of initial attack. From this came the input necessary for developing a fully coordinated initial attack organization capable of meeting revised large fire objectives.

The initial attack analysis based on previous 10-year data resulted in the development of criteria for: 1) the best initial attack mix; 2) the best smokejumper, helitack, and ground

crew mix; 3) the best number and distribution of smokejumpers, helitack, and ground crews; and 4) the best number and distribution of helicopter and retardant facilities.

Distribution of fire load analysis and initial attack mix analysis were completed to meet study area objectives of 2.0 or fewer D or larger fires. Where existing initial attack forces could not meet hour control zones criteria, forces were moved to locations where objectives could be met irrespective of administrative boundaries.

Review Shows Success

During August 1972, a field review was completed on three years' (1970-72) operations of the Salmon-Snake River Fire Management Complex. The review shows three results:

1. Administrative and Fire Control personnel associated with the Salmon-Snake operations were completely sold on the effectiveness of the management concept.
2. During the period 1960-69, the average fire danger severity was 1.06 and for 1970-72 average severity was 1.03, slightly below the previous 10-year average. However, during August 1972, the management area experienced above average seasonal severity and unusually high occurrence. From August 9 thru 12, 1,272 fires occurred in the Western Regions, 162 on Payette, Wallowa-Whitman and Nezperce with 51 fire starts on the management area. Fully preplanned, coordinated, initial attack by smokejumpers, helitack, and ground forces held fires within task force objectives.
3. Suppression costs were re-



Smokejumper descends into fuel typical of the area.

duced from an average annual expenditure of \$532,000 (1960-69 average) to \$48,000 (1970-72 averages) for large fire (Class D and larger) suppression. Savings in suppression costs for the 3-year period, 1970-72, amounted to \$1,452,000 as compared to the previous 3-years annual expenditures. △

Helicopters and Helibuckets Used To Control Interior Alaska Wildfires

Roy M. Percival and Nonan V. Noste

The tactical and logistical problems of controlling remote forest fires in Alaska are tied to the vastness of the country and the limited access to the fires. Aircraft in general and fixed-wing retardant planes specifically have traditionally played an important role in supporting operations. Helicopters and helibuckets are proving to be tools well-adapted to dropping water.



Map of Alaska overlaid on map of the Western States showing relative locations of fire control dispatch centers, circles, and uncontrolled fires, dots, on August 2, 1968.

The tactical problems facing the Bureau of Land Management in meeting its fire control objectives in interior Alaska are unique when compared with the contiguous States. Vastness of the country, lack of roads, and difficult ground travel are part of the difference. The area protected is 225 million acres. There are 4,457 miles of State roads, of which 1,605 miles are paved. For the total 586,000 square miles within the State, average

feet of road per section of land (1 sq. mi.) is 42. Since roads are concentrated between and around areas of population, this leaves immense areas with no access. Tundra, muskeg, and black spruce are associated with poorly drained soils and permafrost on much of the area subject to fire. Travel by foot on this terrain is slow and tiring, and travel by vehicles is often limited to those with low surface

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Table—Use of helicopters by Bureau of Land Management in fire control in Alaska, 1968 and 1969¹

Year	Flying time		Personnel transported	Water dropped	Cargo transported
	Hours	Minutes		Gallons	Pounds
1968	4,085	25	23,149	1,035,100	2,115,521
1969	10,314	12	56,095	14,805,600	5,344,860

¹ Data provided by Bureau of Land Management.

pressure. It has remained, therefore, the job of aircraft in general, fixed-wing retardant planes specifically, to support fire control operations. To give perspective to the logistical problem, look at a map of Alaska overlaid on a map of the Western States

There were 90 uncontrolled fires burning on August 2, 1968: 23 fires had burned 86,000 acres and were being manned by 2,311 men. Sixty-seven fires of low priority had burned 254,442 acres and were not manned.

Helicopters and Helibuckets Used

Helicopters, used both in addition to and as an alternative to fixed-wing aircraft, are an important tool. The plentiful supply of water throughout Alaska and the use of water-dropping helibuckets, begun in 1968, has resulted in the increased use of helicopters for tactical support of fire control forces.

Interior Alaska's 1968 and 1969 fire seasons were severe. Flying time, personnel transferred, and cargo transported by helicopter slightly more than doubled during difficult 1969 (see table), but the amount of water dropped increased from approximately 1 million gallons in 1968 to 15 million gallons in 1969.

Several sizes of helicopters and buckets were tried during the first season. A small Hiller 12E with a 55-gallon Monsoon bucket could make one round trip per minute and compete costwise on very short haul distances (1,000 feet). A large Sikorsky S61, carrying twin PT-450 helibuckets, could deliver 900 gallons per trip. In 1969, the trend was toward intermediate-size aircraft like the Bell 204-B, with some use of aircraft the size of the FH1100.

see Heli, p. 18

WILDFIRE! A Story of Modern Firefighting



In this new publication, dramatic narrative is accompanied by vivid color illustrations. For anyone, but especially for the general public, this new publication is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Catalog No. A1.68:993, S/N 0100-2598. Price: 60¢. 

Heli, from p. 17

Water from helibuckets was dropped to (1) construct temporary and permanent lines, (2) reduce rate of spread and intensity, (3) control spot fires, and (4) facilitate mopup. Dropped water has temporarily stopped active fire fronts in the scattered spruce-tundra fuels characteristic of many large Alaskan fires, providing time for hand crews to successfully construct line. Individual new starts that could have developed into major fires have been controlled. Water has been used during burnout operations to reduce intensity inside the fire line and to prevent ignition of spot fires and slow their spread outside the line. Water has been able to stop individual trees from torching, thus helping to prevent spotting.

Mopup requires precise drops and concentration of water in the subsurface fuels, however, helicopter pilots have difficulty achieving direct hits on isolated hot spots. Perhaps delivering water by helicopter to collapsible tanks for application by ground crews is an alternative.

The main advantage of dropping water by helicopter is timeliness. Because abundant small potholes in the immediate fire area provide a good opportunity for the "hover fill" technique, a helicopter can be diverted from delivering men and supplies to water dropping on a flareup within minutes. The time advantage over ordering retardant aircraft from a distant air tanker base can mean savings of lost lines.

It is becoming common to assign a helicopter equipped for instant hookup of a helibucket to individual project fires. Helicopters and helibuckets for dropping water are proving to be a well-adapted tool for supporting remote Alaska fire control operations. 

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Yes, There Is a Friendly Flame

A new film "The Friendly Flame" has been produced by Film Communicators of Hollywood, Calif.

This prescribed burning film explains how natural fires influenced forest perpetuation in the past, how skilled foresters use fire as a tool in management today, and why the continued use of fire is essential to maintenance of the forest environment. The system used to manage smoke from prescribed burning

is also explained.

The Forest Service believes this is an outstanding, timely film for conveying to new employees, other agencies, groups, and the general public the need to use prescribed fire.

Each Region of the Forest Service now has copies of "The Friendly Flame." Others interested in purchasing copies can do so from: Film Communicators, 5451 Laurel Canyon Blvd., Hollywood, Calif. 91607.

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Results of Canadian Study, Combined Aircraft Tower Detection Frees Money, Can Benefit Public

R. R. Fielder, R.S. Nield, and
R. C. Sutton



Re-evaluation of the detection system indicates fewer towers and more air patrols will save money, which can then be spent in public information programs and public fire reporting facilities.

Both the increasing maintenance costs of a fixed lookout network and the apparent decline in the effectiveness of tower detection pointed up the need for a reanalysis of the total provincial detection system. Because the lookout network in the Vancouver District was the oldest, it was studied first.

The study utilized computer techniques to analyze fire data from fire reports for the 19-year period 1950-68. This provided the basic data for the study. In addition, a comprehensive field questionnaire was completed in every Ranger District.

Detection problem areas and problem fires were isolated using the Provincial Fire Atlas

maps and overlays. The actual and potential capabilities of all lookouts¹ were determined from the basic data. In the final analysis, a fixed budget approach was used in determining the best combination of fixed lookouts, air patrols, and ground patrols to be employed.

As a result, two specific air patrols were recommended—one on Vancouver Island and the other on the lower mainland—with schedules determined by danger-class days. Four specific ground patrols were recommended.

The restructured detection system will result in a significant dollar saving which, in this high population district, would best be used for public information programs and improved public fire reporting facilities. 

¹ Of the original 32 lookouts; the study showed 16 be abandoned, 11 retained as primaries, and 5 as secondaries.

The three authors are researchers on Project No. 69A, Analysis of the Vancouver Forest District Detection System-1972, B.C. Forest Service, Protection Division, Victoria, British Columbia.